

REMARKS

Reconsideration and further examination of the present application is respectfully requested.

35 U.S.C. § 112

Claim 1 was rejected under 35 U.S.C. § 112 as containing subject matter which is not described in the specification. Applicants respectfully submit, however, that amending the claim to include a pH level from "above 1.5" to "above 1.5 and below 3.0" properly narrows the range limitation of the original claim, and is allowed under MPEP 2163.05, section III (Ed. 8, Aug. 2001).

Further, Applicants respectfully submit that there is support in the specification to limit the pH level to below 3.0. Examples 2-4 provided from pages 10-11 disclose slurries which all have pH levels below 3.0.

35 U.S.C. § 103(a): Grover in view of Skrovan and Beyer

Claims 1-5, 7 and 14 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Grover in view of Skrovan and Beyer. Applicants respectfully traverse this rejection in view of the following analysis.

In rejecting claims 1-5, 7 and 14, the Office Action on page 3, lines 4-10 states:

...Unlike the claimed invention, Grover doesn't describe the cerium ions being in quantity equal to the inclusion of at least 0.02 molar or 0.05-0.1 molar ammonium cerium nitrate in the liquid or the pH below 3.0. However, he describes the concentration of ammonium cerium nitrate is about 0.05-10 wt%, which would include claimed at least 0.02 molar, and concerning the pH of the solution, it is well known to polish metal with an acidic solution, such as a pH <4 and dielectric layer with a basic solution, a pH >7 (please see Skrovan and Beyer references cited below). It would have been obvious at the time of the invention for one skill in the art to determine the optimum concentration of etching parameters including pH, chemical concentration in the slurry through test run depending on the material being polished with an anticipation of the expected result.

Applicants respectfully submit, however, that this conclusion of obviousness is improperly drawn in hindsight only after reading Applicants' claims. The Office Action does not point out any teaching or suggestion from Grover, Skrovan or Beyer as to why one of ordinary skill in the art would have been motivated to combine the teachings in the manner suggested in the Office Action. In fact, Grover teaches away from the modifications suggested in the Office Action by teaching the composition of the disclosed slurry must have a pH level above 3.0 to be effective as a chemical-mechanical polishing (CMP) slurry. See column 6, lines 21-37.

Applicants also respectfully submit that by suggesting that it would have been obvious of one of ordinary skill in the art "to determine the optimum concentration of etching parameters including pH, chemical concentration in the slurry through test run depending on the material being polished" the Examiner is applying an improper "obvious to try" rationale according to MPEP § 2145, section X (Ed. 8, Aug. 2001).

Further, Applicants respectfully submit that the suggested modification would render the slurry disclosed in Grover ineffective for its intended purpose, to polish oxide. To meet the claims of the present application, the slurry disclosed in Grover would have to be modified to have a pH level below 3.0, which would render the slurry ineffective as a CMP slurry for polishing oxide, according to the teachings of Grover. According to MPEP § 2143.01 (Ed. 8, Aug. 2001):

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

Therefore, Applicants respectfully submit there is no suggestion or motivation to make the proposed modification to meet claim 1. Accordingly, Applicants submit it would not have been obvious at the time of the invention for one of ordinary skill in the art to make the proposed modification to meet claim 1.

Therefore, Applicants submit that claim 1 is patentable over Grover in view of Skrovan and Beyer. Claims 2-5, 7 and 14 each depend, directly or indirectly, from claim 1. Therefore, Applicants submit that claims 2-5, 7 and 14 are also patentable over Grover in view of Skrovan and Beyer. Accordingly, Applicants respectfully request removal of this rejection.

35 U.S.C. § 103(a): Farkas

Claims 1-5, 7 and 14 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Farkas et al. in view of the Farkas article. Applicants respectfully traverse this rejection in view of the following analysis.

In rejecting claims 1-5, 7 and 14, the Office Action on page 3, line 21 - page 4, line 10 states:

...Unlike claimed invention, Farkas doesn't describe the polishing parameters such as pH, and chemical concentration in the slurry. Farkas also shows in his article of "Oxidation and Etching of the Tungsten in CMP Slurries" wherein table 1 and 2 shows different oxidizing agent concentrations and their pHs are run with their respective CMP rate and etch rate. The slurry also contains 3 wt% of abrasive of alumina. Silica-based slurry is also conventional and known to one skill in the art for polishing tungsten and metal (pg 25-31). Also it is well known to polish metal with an acidic solution, such as a pH <4 and dielectric layer with a basic solution, a pH >7 (please see Skrovan and Beyer references cited below). Therefore, it would have been obvious at the time of the invention for one skill in the art to determine the optimum polishing parameters including pH, concentration of chemicals and other components in the slurry through test runs, which would also depending on the type of material being polished.

Applicants respectfully submit that by suggesting that it would have been obvious of one of skill in the art "to determine the optimum polishing parameters including pH, concentration of chemicals and other components in the slurry through test runs" the Examiner is applying an improper "obvious to try" rationale according to MPEP § 2145, section X (Ed. 8, Aug. 2001).

The Examiner cites the Farkas et al. patent as describing a slurry comprised of the chemical elements claimed in the present application, except for the pH level and chemical

concentration of the slurry. The Examiner then cites the Farkas article as showing different oxidizing agent concentrations with their pH levels and respective CMP rates in tables 1 and 2.

Applicants respectfully submit, however, that while table 1 shows the oxidizing agent concentrations of different CMP slurries with respect to their removal rate, the table does not show pH levels; and while table 2 shows pH levels, the table shows wet etch rates, not CMP rates. Neither table shows the chemical concentration of different slurries with their pH levels and CMP rates. Applicants further submit that neither the Farkas et al. patent nor the Farkas article contain any suggestion that the teachings be combined as suggested in the Office Action.

Therefore, Applicants respectfully submit that claim 1 is patentable over the Farkas et al. patent and the Farkas article. Claims 2-5, 7 and 14 each depend, directly or indirectly, from claim 1. Therefore, Applicants submit that claims 2-5, 7 and 14 are also patentable over the Farkas et al. patent and the Farkas article. Accordingly, Applicants respectfully request removal of this rejection.

35 U.S.C. § 103(a): Farkas in view of Brusic

Claims 6, 8 and 9 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over the Farkas et al. patent and the Farkas article in view of the Brusic et al. article. Applicants submit that Brusic does not affect the patentability of claim 1. Because claims 6, 8 and 9 each depend, directly or indirectly from claim 1, Applicants submit that claims 6, 8 and 9 are also patentable over the Farkas et al. patent and the Farkas article in view of the Brusic et al. article. Accordingly, Applicants respectfully request removal of this rejection.

35 U.S.C. § 103(a): Farkas in view of Grumbine

Claims 10-13 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over the Farkas et al. patent and the Farkas article in view of the Grumbine et al. Applicants submit that Grumbine does not affect the patentability of claim 1. Because claims 10-13 each depend, directly or indirectly, from claim 1, Applicants submit that claims 10-13 are also patentable over

the Farkas et al. patent and the Farkas article in view of Grumbine et al. Accordingly, Applicants respectfully request removal of this rejection.

CONCLUSION

Applicants respectfully submit the present application is in condition for allowance, for which early action is earnestly solicited.

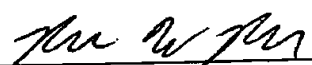
The Examiner is invited to telephone the undersigned to help expedite any further prosecution of the present application.

The Director of the U.S. Patent and Trademark Office is hereby authorized to credit any overpayment or to charge any fees or fee deficiencies under 37 C.F.R. § 1.16 and § 1.17 in connection with this communication to our Deposit Account No. 02-2666.

Respectfully submitted,

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Date: 10-01, 2001


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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

5. (Amended) The slurry of claim 1 wherein the second pH value is at least [between]
2.5 [and 4].